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ABSTRACT

Are there universal characteristics of adult thought? If so, how do they evolve and manifest themselves in cultures throughout the world? Piaget's formulation of formal operations is the best known and most extensively researched answer to the question regarding universal characteristics. Theoretical alternatives to formal operations differ in the specific characteristics proposed as defining adult thought, but they share an assumption about a level beyond formal operations that has come to be characterized as post-formal. Judgment and reasoning constitute a central psychological process in adult thought. The appropriate type of task with which to assess judgment is one in which there is no "correct" solution. Rather, irreconcilable alternatives should be considered and evaluated. A general methodology for investigating the nature of adult thought is proposed within the framework of systems developed by Oser and Reich (1987) and by Wood (1983). A review of a wealth of disparate published reports indicates a consistent suggestion of a distinctively adult level of thought whose manifestation may be influenced by a variety of factors, none of which is presently clearly identifiable. Whether this level is universally attained or whether it is better viewed as a style whose evolution may also be influenced by educational and cultural factors as well as "native endowment" remains to be determined. (YLB)

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Toward a Cross-Cultural Examination of Adult Thought

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Abstract. Are there universal characteristics of adult thought, and, if so how do they evolve and manifest themselves in cultures throughout the world? Several answers that have been proposed are reviewed: Piaget's description of formal operations and the many descriptions of what has been called post-formal thought. It is suggested that judgment and reasoning constitute a central psychological process in adult thought. After a description of the major characteristics of judgment (that the process is ubiquitous, fallible, and dependent upon criteria), it is further suggested that the appropriate type of task with which to assess judgment is one in which there is no unique "correct" solution. Rather, there must be irreconcilable alternatives to be considered and evaluated. After considering some tasks that satisfy these criteria, some criteria for evaluation of responses are discussed within the framework of systems proposed by Oser and Reich (1987) and by Wood (1983)

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Toward a Cross-Cultural Examination of Adult Thought

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I would like to take advantage of this opportunity to raise a difficult question to which there is not as yet any adequate answer in the hope that our discussion might bring us closer to both a more adequate formulation of the question and feasible avenues of its investigation. The question concerns the later stages of cognitive development, specifically whether there are universal characteristics of adult thought and, if so, how they evolve and manifest themselves in different cultures throughout the world. The goal of this inquiry is to establish guidelines for meaningful cross-cultural research on cognitive development. The results of such research should not be--as it has so often been to date--an inter-cultural comparison of level of intelligence but, rather, a more detailed understanding of adult thought and its modes of evolution more generally.

What are the Characteristics of Adult Thought?

Piaget's answer. There are already a variety of answers to this question. The best known and most extensively researched is Piaget's formulation of formal operations (Inhelder & Piaget, 1958). It proposes that during adolescence there is a qualitative change in the structure of thought to a closed system having a number of identifying properties. The most general defining properties are a) the elements of thought are represented in the form of propositions:

testable statements rather than properties and relations of objects and events; and b) orientation in the realm of the possible (i.e., starting within a context of alternative possibilities of which the actual and immediate is a subset) rather than the actual here and now. The structure of mental transformations (the formal operations themselves) performed upon propositions is a closed system of four transformations: the INRC group, whose components are Identity, Negation, Reciprocity, and Correlative. In addition, a second logico-mathematical structuring is invoked, the 16 binary combinations of propositions, p and q and their complements taken n at a time (where n = 0 - 4). The proposed operations have been embodied in two classes of tasks: physical experiments dealing with isolation of variables and their coordination and a set of formal operational concepts transcending direct experience (e.g., proportion, probability, correlation, combinatorial schemes, coordination of frames of reference, higher order conservations, etc.). The latter are less frequently employed in research than the former.

The results of research purportedly conducted within this theoretical framework, both within and across cultures suggest that the level of formal operations is not universally attained (cf., Neimark, 1975, 1982a for recent reviews). The results led Piaget (1972) to speculate that a) rate of attainment of this final level is influenced by environmental factors, or b) formal operations is not properly a stage but "a structural advancement in the direction

of specialization" or c) attainment of this final level is contingent upon aptitudes and professional specialization. Piaget himself favored the third alternative although he also noted a fourth possibility that the tasks employed may not be universally appropriate. All alternatives, however, imply that there is a stage characteristic of adult thought that is attainable, in principle, by all normal adults. This implication is also a logical consequence of the nature of Piaget's theory, i.e., that it is a normative, or competence, theory detailing the expected course of development under optimal conditions rather than a descriptive theory encompassing all the factors that might influence performance and the nature of their effects. The relatively few studies addressed to a competence/performance differentiation (e.g., Danner & Day, 1977; Stone & Day, 1978) yield evidence that formal operations competence is, in fact, demonstrable as a result of relatively minor procedural modifications. Although Stone & Day (1980) prefer to interpret the results within a Vygotskian framework of the zone of proximal development, it should be clear that the alternative explanations are not incompatible, much less exclusive and exhaustive.

I shall pursue the empirical questioning of the theory of formal operations briefly, and within the context of a moderators of competence interpretation, because, as will be shown shortly, it is also relevant to the second question of how adult thought should properly be investigated. If one assumes, as I do both personally

and for purposes of the present enterprise, that at least the major defining characteristics of adult thought (i.e., starting from the realm of the possible and propositional representation) are indeed characteristic and universally attainable in principle then it is useful to consider some of the empirically demonstrated factors that limit its expression in performance. One obvious factor is the nature of the experimental tasks themselves, especially those taking the form of physical experiments on identification and coordination of controlling variables. Although cross-cultural work in industrialized Western societies tends to be consistent, work in non-western cultures provides little if any evidence of attainment of formal operations (Dasen, 1977; Dasen & Heron, 1981); however, Saxe (1979) using an indigenous knowledge system in Papua New Guinea, reported their attainment between 13-19. On the face of it the tasks appear to be foreign and confusing to non-western subjects. Why this should be the case is deserving of further scrutiny. Certainly the material as well as the type of reasoning required have not been encountered in everyday experience. Where they are experienced by most Western subjects is in school, and schooling has been shown to be a factor affecting performance. The nature of its effect, however, is not confined to content per se. Rogoff (1981) in a very insightful review of the effects of schooling argues that "schooling" is a gross umbrella rubric for a host of factors, some of which are more elusive than others. For example, Luria (1976) and Scribner (1977) using a simpler deductive

reasoning task with natives of Uzbekistan and Liberia, respectively, both found the same characteristic errors of reasoning. Luria interpreted them as refusal to accept the task (i.e., treating the argument as a coherent entity rather than dealing with its separate propositions); Scribner interpreted them as evidence of "empirical bias". Deductive reasoning may not "come naturally" to most adults; a minimal amount of schooling appears to be a necessary--but not sufficient--precondition for its appearance.

Acquaintance with a mode of reasoning rather than content per se is implicated as the central variable by two kinds of evidence. The first kind of evidence comes from tasks deliberately designed to provide relatively content-free (i.e., pure) embodiments of a specific form of reasoning. My own diagnostic problem solving task (Neimark & Lewis, 1967, 1968) provides an example; while it is useful with American children, the Whitings and their associates (Davis, 1987) found difficulties in using it with Moroccan children. Comparable evidence has been obtained from attempts at developing "culture fair" tests of general intelligence (Jensen, 1980). It may be that the use of arbitray material signals that abstract reasoning is needed only for groups conventionalized to this practice: i.e., that this mode of approach is not appropriate for its goal. Alternatively, it may be that it is successful and that there are real culture and class differences in intelligence (cf., the dispute between Humphreys and Jensen, 1985). At present, it is not possible to distinguish between these two alternatives. A second line of

evidence comes from experiments in which content familiarity is systematically varied. The results here (e.g., Kuhn & Capon, 1979; Lancy, 1983; Newman, Attig, & Kramer, 1983) are hopelessly inconsistent: sometimes familiar material improves performance; sometimes it has no effect; and sometimes it leads to poorer performance.

Other variables affecting performance might be classified as inter-cultural and inter-individual. Most prominent among the former are class (SES) and regional differences (e.g., urban vs. rural or agriculture vs. hunter-gatherer). Differences in favor of upper class and urban individuals in both level and rate of its attainment have been reported on a wide variety of tasks. Such differences are probably not independent of the effects of schooling and, as in the case with schooling, "class" and "region" are not unitary factors but global rubrics for a number of components. With respect to individual differences, what might be called cognitive style, we are again confronted with a Pandora's box which is yet to be unpacked. Most of the available research has used a limited number of cognitive style tests (most often Witkin's measures of field dependence/independence) as a basis for constituting groups. Such evidence generally tends to show a performance advantage for a particular cognitive style, e.g., field independence (Case, 1974; Linn, 1979).

Post-formal answers. A number of objections to Piaget's characterization of adult thought have begun to appear. They tend

to be largely theoretical and to be lacking in empirical support; moreover, none of the discussions even raises the issue of cross-cultural comparison. Although these theoretical alternatives to formal operations differ in the specific characteristics proposed as defining of adult thought, they share an assumption that there is a level beyond formal operations that has come to be characterized as post-formal (Commons, et al., 1984). As Kramer (1983) has correctly noted, many of these views are not incompatible with Piaget's treatment of formal operations but, rather, differ in the aspect focused upon. One relevant differentiating feature, however, seems to be the status assigned to formal operations: for some theorists (e.g., Arlin, 1984; Kitchener, 1983) formal operations are viewed as a necessary but not sufficient, precondition to advancement to the later, post formal, stage; other theorists (e.g., Labouvie-Vief, 1984; Broughton, 1984) hold that formal operations comprise a circumscribed, culturally limited, set of skills not universally characteristic of adult thought. This second group of views raises a number of issues pertinent to our discussion. Pascual-Leone (1984) notes that adult thought deals with change, a condition which is not adequately encompassed by formal logic but is the focus of dialectic. Another important differentiation concerns the customary role of thought in the life of the individual. The adult, it is asserted, is more directed to practical matters as a result of which he or she is concerned with the feasibly possible and choosing a "best fit" rather than a perfect fit" (Arlin, 1984)

in defining an individual role in society. Within this framework, it is natural to emphasize quality of judgment and the role within it of expectancies (Linn & Siegel, 1984), priorities (Neimark, 1982), frames of reference (Arlin, 1984), self-awareness (Kitchener, 1983) and self-direction (Lefebvre-Pinard, 1983), and relativism (Perry, 1981; Sinnott, 1984). These elements correspond quite closely to the attributes of wisdom identified by Holliday and Chandler (1986) along with related views of Dittman-Kohli and Baltes, 1985, or Meacham, 1983.

A proposed synthesis. As suggested above, the views of many post-formalists direct attention away from the traditional Piagetian context of solving problems for which there is a correct solution to judgement about choice and action in situations where there is no unique "correct solution". That state of affairs accurately describes most interpersonal situations with which adults are daily involved, as for example, in resolving moral dilemmas or in developing a concept of self. Both these examples have been the subject of developmental investigation that reveals clear progressions (Kohlberg, 1976, for moral dilemmas and Perry, 1970, for concept of self). Before considering them, however, a bit more attention should be devoted to the judgment process itself. Although psychologists have studied judgments about a great many realms, analysis of the process itself has almost disappeared from modern psychology save for studies in psychophysics, psychometrics, and signal detection. There are three characteristics of judgment to be noted at the outset: its ubiquity, its fallibility, and the

central importance of criteria. With respect to ubiquity, little additional comment is required. With respect to fallibility, the process is inherently and inescapably subject to error--in contrast to, for instance, problems solving or performance of some skill, where errorless performance is possible. Criteria, as noted, are central to judgment. Usually multiple criteria are possible, and they will differ with respect to their appropriateness and adequacy as well as their status in consciousness and the ability of the judge to justify their application. Wood (1983) has recently suggested that Churchman's inquiry systems have great applicability to developmental study of problem solving. It seems to me that they are even more generally applicable to judgment tasks, and that they could provide an excellent framework for developmental investigation of the judgment process. Although I know of no systematic effort in this direction save for the work of Oser and Reich (1987), it should be noted that quality of judgment is one of the major dimensions upon which maturity is evaluated in everyday life. All societies, so far as I know, prize sound mature judgment and have at least an intuitive model of what constitutes sound mature judgment. I would be surprised if those models differed significantly across cultures--although they may; again, there is no good data that I know of upon which to base a comparison. What I am suggesting is that this neglected area is a fruitful and potentially important one for serious systematic investigation.

Some of the questions to be raised in evaluating the quality of judgment include: How many factors are considered? Are they

equally or differentially weighted? How explicit is the weighting process? What criteria are employed? Are other possible criteria considered? On what basis is the selected criterion chosen or defined? Is the judgment task placed in a broader context or related to similar instances? Is there a formal explicit model or set of guiding principles invoked? How deeply are potential consequences of alternative judgments and courses of action explored? In reviewing these questions, the reader may begin to wonder if these are not questions about how the individual structures his or her world. They are and that observation further strengthens my position that form and quality of judgment are among the most basic and central aspects of individual thought. This assertion, it should be noted, carries with it a crucial implicit assumption that quality of judgment is a relatively consistent, stable, individual characteristic that is relatively content-and context-free. That assumption is, of course, open to empirical investigation. It may well turn out that consistency in the quality of judgment is itself variable among individuals. Certainly each of us knows some very "smart" people who, on occasion, show very poor judgment: e.g., the world-class mathematician who is a social moron or, conversely, the simple grandmother with canny understanding of human motivations. These considerations might lead one to question whether quality of judgment will turn out to be more a matter of individual style than of the substance of cognitive growth. Again, that is an empirical question remaining to be answered. It is, however, a question worth raising.

How Should the Properties of Adult Thought be Examined?

I have already suggested the ingredients of a general procedure for investigating the nature of adult thought as well as some of the defining properties to be looked for. They will be summarized here along with some of the pitfalls of interpretation to be guarded against in going from data to theory.

A general methodology. The general procedure consists in posing to the subject a task that is meaningful and within his or her realm of experience about which a judgment is to be made and justified. An additional requirement is that more than one such task be given in order to assess the generality of the individual's approach across particular subject matters. The tasks themselves might take the form of a moral dilemma, selecting a course of action, explaining some phenomenon, or resolving a conflict (or some combination of these); but a necessary feature of the task must be that there is no unique correct "solution". Rather, there must be irreconcilable alternatives to be considered. Evaluation of the response would, then, take the form of rating the quality of judgment displayed with respect to: a) identification of alternatives, b) attempts to relate them, c) posing of explicit criteria for an adequate resolution, along with d) possible weightings or prioritizing, and e) justification of the resolution offered (e.g., is it ad hoc and narrowly appropriate or set within the context of a broader epistemological framework whose regulating principles are invoked?). By way of illustration of the

kind of examination of levels of judgment that could be made I include Table I, the levels of complementarity in explanation of Oser and Reich (1987) and the Inquiry Systems of Wood (1983), Table II. Neither is fully adequate for the dimensions of evaluation I have suggested but the Oser and Reich system provides a promising start.

Insert Table I and II about here

Defining properties of adult thought. Some of the multitude of defining properties of adult thought have been outlined earlier; to the extent that each is a possible relevant ingredient, I would like to encompass all of them but some systematic framework is required to do so sensibly. The closest approach I know of to the necessary framework is the work of Demetriou and Efklides (1985) who administered a battery of tasks to a large number of individuals differing in age, sex, and social class. They hypothesized the existence of three spheres of thought: experimental, relational, and strategic-metacognitive, that were generally validated in the results of a factor analysis yielding three factors roughly corresponding to each of the hypothesized spheres. The first two factors, the experimental capacity factor and the relational capacity factor, were intercorrelated and earlier in appearance than the third factor. This third factor, which they identify as the "capacity to conceive of possibilities and reflect upon them" appears to be semi-autonomous and is discussed by the authors in

Table I. Levels of the development of thinking in terms of complementarity

Level	Description
I	A and B are considered separately; spontaneous reaction 'right' or 'false'. Emphasis on alternatives, not complementarity as a concept. Usually single-track choice of A or B, occasionally both (without offering a detailed justification), depending on chance knowledge or socialization. Usually 'external' justification: heard at home/in school; seen on TV; 'just so in the head'. But also reference to a particular, directly relevant personal experience
II	The possibility that A and B might both be right is considered. A may be right, B may be right, both may be right (possibly with very different weighting factors). Justification by means of 'external' factual arguments, but reformulated actively.
III	The necessity for explaining X with the help of A as well as by means of B is examined. Neither A nor B are generally considered quite correct individually, both are needed (partially). Justification: reasoning from personal experience, reflected and (possibly) generalized. Dim perception of domain dependence of truth criteria.
IV	Conscious connecting of A and B, explicit explanation of their relation. Neither A nor B is correct (alone). The relation between A and B is analyzed (for instance 'B permits making use of A', 'B cannot exist without A,' etc.). Justification: causal chains; personal view built up over time, including domain-dependent truth criteria.
V	Generalized supertheory including (reconstructed parts of) A and B, whose complex relations are understood at an advanced scientific level, e.g., A and B are complementary sensu Bohr. Justification: domain-dependent high-level argumentation, moderated/reinforced by personal experience and reflection as well as by views resulting from discourse. Full awareness of various limits to knowledge (e.g., 'we know this, but we cannot prove it').

From Oser & Reich (1987)

Table II. Inquiring systems compared along selected salient aspects of decision theory

Problem characteristic	Leibnizean IS	Lockean IS	Kantian IS	Dialectical IS	Churchman/Singer IS
States of nature $S(j)$	not applicable	enumerable	enumerable	poorly specifiable not enumerable	not applicable
Probability of states of nature $P(S(j)\|A(i))$	not applicable	known, known with confidence, not known with confidence	may vary depending on context	may be known within one context but not across all perspectives	not applicable
Acts open to decision maker (D) $A(i)$	known, well structured (i.e., symbolic expressions)	precisely specifiable	specifiable to a degree of accuracy	acts with respect to the problem situation are based on compromise and/or resolution of conflicting contexts/ perspectives	any act to determine the teleological schema or purposiveness of valuations implicit in utility function
Utility to D across various actions and states of nature $U(i,j)$	positive utility applies to all wff's according to prescribed criteria, negative to all others	specifiable if binary, is classical statistics problem if known, is classical utility problem if known with confidence, is Bayesian utility problem	more than one available, 'final' utility is a combination	may be specifiable but is contradictory across perspectives, utility attaches to method of inquiry	utility of methodology/ inquiring process to society
Information units	axioms, elementary analytic truths	elementary empirical judgments (sense data) based on internal symbolic representation	empirical judgments at least two alternate representations for data	at least two conflicting representations with respect to the problem situation	IS functioning
Outcomes $O(i,j)$	production of well-formed symbol strings	empirical content (protocols) specifiable, known with confidence	moderately specifiable decision incorporating alternate representations	exposing of underlying assumptions and appropriate adjustments in problem perception	better understanding of appropriateness of functioning of IS
Guarantor	precise specification of proofs, sufficiency, and comprehensiveness	agreement with other Lockean IS	degree of fit between underlying theory and presumption of the theory	intense conflict	deontic logic 'heroic mood'
Structure of problems processed by IS	well structured	well structured, moderate structure	moderate ill structure	moderate or low structure	not applicable

From Wood (1983)

relation to the Inquiry Systems proposed by Wood (1983). Performance on the tasks loading on that factor did not, however, show consistent improvement with age: there appeared to be a temporary decline at 18 followed by improvement at 21 with the 45 year-olds performing at a lower level. Interpretation of these results is complicated by possible non-comparability of the cross sectional age groups and by the relatively technical nature of the tasks. Given the impressively orderly development reported by Oser and Reich (1987) on more purely dialectical reasoning tasks with everyday material one might suspect some artifactual confounding.

What I conclude on the basis of this compressed review of a wealth of disparate published reports is that there is consistent suggestion of a distinctively adult level of thought whose manifestation may be influenced by a variety of factors none of which is presently cleanly identifiable. Whether this level is universally attained or whether it is better viewed as a style whose evolution may also be influenced by educational and cultural factors as well as "native endowment" is yet to be determined. At our present state of knowledge the qualities of mature thought seem to me to be most appropriately coordinated to qualities of judgment in reasoning on multifactorial tasks employing everyday content that have no unique solution but, rather, require formulating alternatives and pursuing their implications. Present evidence suggests that dilemmas constitute an appropriate task, be they Kohlbergian moral dilemmas--appropriately corrected for cultural

(Snarey, 1985) or sexist (Gilligan, 1982) bias--dilemmas of world view (Kitchener & King, 1981), values (Orbach, Iluz & Rosenheim, 1987), or dealing with complementary hypotheses (Oser & Reich, 1987). Perhaps as a result of our discussions here a preliminary set can be constructed. It may be the case that there will be cultural differences in the kinds of criteria invoked, or the values that they reflect (e.g., promoting group vs. individual welfare) as well as educational differences in the articulateness of their expression or supporting arguments and experiences invoked for their justification, but it should be the case that a developmental progression can be observed.

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